

## ABSTRACT

### METHOD FOR REPAIRING COATED COMPONENTS USING NiAl BOND COATS

5 According to an embodiment of the invention, a method for repairing a coated high pressure turbine blade, which has been exposed to engine operation, to restore coated airfoil contour dimensions of the blade, and improve upon the prior bond coat is disclosed. The method comprises providing an engine run high pressure turbine blade including a base metal substrate made of a nickel-based alloy and having thereon a thermal barrier coating system. The thermal barrier coating system comprises a diffusion bond coat on the base metal substrate and a top ceramic thermal barrier coating comprising a yttria stabilized zirconia material. The top ceramic thermal barrier coating has a nominal thickness  $t$ . The method further comprises removing the thermal barrier coating system, wherein a portion of the base metal substrate also is removed, and determining the thickness of the base metal substrate removed. The portion of the base metal substrate removed has a thickness,  $\Delta t$ . The method also comprises applying a  $\beta$  phase NiAl overlay coating to the substrate, and determining the difference in thickness,  $\Delta x$ , between the  $\beta$  phase NiAl overlay coating and the previously removed bond coat. The method further comprises reapplying the top ceramic thermal barrier coating to a nominal thickness of  $t + \Delta t - \Delta x$ , wherein  $\Delta t$  compensates for the portion of removed base metal substrate. Advantageously, the coated airfoil contour dimensions of the high pressure turbine blade are restored to about the coated dimensions preceding the engine run.

30